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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/757,256	01/14/2004	Jimmie Earl DeWitt JR.	AUS920030545US1	6483
35525	7590	05/03/2006	EXAMINER	
IBM CORP (YA)			LAI, VINCENT	
C/O YEE & ASSOCIATES PC			ART UNIT	
P.O. BOX 802333			PAPER NUMBER	
DALLAS, TX 75380			2181	

DATE MAILED: 05/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/757,256	Applicant(s) DEWITT ET AL.	
	Examiner Vincent Lai	Art Unit 2181	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 15-22 and 29 is/are rejected.
- 7) ☒ Claim(s) 9-14 and 23-28 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

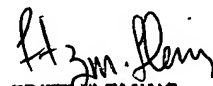
Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 January 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


FRITZ FLEMING
 Supervising PRIMARY EXAMINER 5/1/2004
 GRC 502109
 A42181

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>1/14/04 & 7/1/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on 1/14/2004 and 7/1/2005 was considered by the examiner.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Element 260 of figure 2. It is also of note that due to the number of figures not all of the elements of the figures have been checked to see if they are mentioned in the description and the applicant's cooperation is requested in correcting any errors of which applicant may become aware in the drawings. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and

informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The abstract of the disclosure is objected to because of its length. An abstract is limited to 150 words whereas the submitted abstract is approximately 153 words. Correction is required. See MPEP § 608.01(b).

4. The disclosure is objected to because of the following informalities:
The cross-reference to related applications section of the specification is incomplete.
Appropriate correction is required.

5. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

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6. Claims 1, 3-8, 15, 17-22, and 29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. There are no tangible end results from implementing the claims in question because the end result is a determination or an identification, which both lack a tangible "real world" result. Although some claims do have intermediate steps that produce an intermediate tangible result, the end result still lacks tangibility.

Claims 15-28 are also directed to non-statutory subject matter because of an improper definition of acceptable computer readable media. Such forms of unacceptable computer readable media include the disclosed "radio frequency and light wave transmissions" detailed on page 27 in the submitted specification.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-5, 15-19, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmberg (U.S. Patent # 6,233,679 B1), herein referred to as Holmberg in view of Burrows (U.S. Patent # 5,887,159), herein referred to as Burrows.

As per claim 1, Holmberg teaches a method, in a data processing system, for processing instructions of a computer program, comprising:

enabling counting, by a processor, of a number of times instructions of the portion of code of the computer program, having an associated performance indicator, are executed to generate a first count (See column 4, lines 56-67: Multiple counters are used—including one for counting the times an instruction is executed);

enabling counting, by a processor, of a number of times there is a cache miss when executing instructions of the portion of code of the computer program having associated performance indicators to generate a second count (See column 4, lines 56-67: Multiple counters are used—including one for counting the times an instruction is not taken); and

determining if a problem condition is present in a cache based on the first count and the second count (See figure 2 and 3: Counters are checked to see if a threshold condition has been exceeded).

Holmberg does not teach a performance indicator or a system for tracking data beyond branch instructions and pertains to branch instructions only.

Burrows does teach a performance indicator (See figure 5, and column 5, lines 11-13: The count field 530 is an indicator of how many times the code has been encountered) and associating a performance indicator with at least one instruction of a portion of code of the computer program (See figure 5: The count field is placed within an instruction). Burrows' invention also applies to any sort of instruction.

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased. The performance indicator is another form of providing more data. It is also of note that one of the references cited in Holmberg is Burrows.

As per claim 2, Holmberg teaches wherein the first count and the second count are maintained in a hardware counter associated with the processor (See figure 1 and 2: The counters 209, 211 are part of the branch prediction unit 119, which is a part of the processor).

Holmberg does not teach providing statistics for non-branch related instructions.

Burrows does teach providing statistics for non-branch related instructions (See column 2, lines 47-49).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased.

As per claim 3, Holmberg teaches wherein determining if a problem condition is present in a cache based on the first count and the second count includes:

generating a cache hit-miss ratio based on the first count and the second count (See column 4, lines 56-63 and column 5, lines 39-43: Multiple counters are used to track data and that data is compared by seeing how relatively close to being equal they are—which is a ratio);

comparing the cache hit-miss ratio to a predetermined threshold value (See column 5, lines 28-31: The data is compared to a preset threshold value); and

determining that a problem condition exists if a predetermined relationship between the cache hit-miss ratio and the predetermined threshold value is present (See column 5, lines 28-43: New predictions are made if threshold value is surpassed).

Holmberg does not teach providing statistics for non-branch related instructions.

Burrows does teach providing statistics for non-branch related instructions (See column 2, lines 47-49).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased.

As per claim 4, Holmberg teaches sending an interrupt if a problem condition is determined to be present (See figure 3a: A count greater than the threshold results in a new prediction to be made and thus the system must be informed of this with interrupts signals).

Holmberg does not teach a performance monitor application nor does Holmberg teach providing statistics for non-branch related instructions.

Burrows teaches sending an interrupt to an interrupt handler of a performance monitoring application if a problem condition is determined to be present (See column 2, line 62: A signal is sent to generate a monitor program).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased. The addition of a monitor application is yet another form of providing more data.

As per claim 5, Holmberg teaches the predetermined relationship is that the cache hit-miss ration meets or falls below the predetermined threshold value (See column 5, lines 28-31: The data is compared to a preset threshold value and the preset threshold value can be set so such condition is met).

Holmberg does not teach providing statistics for non-branch related instructions.

Burrows does teach providing statistics for non-branch related instructions (See column 2, lines 47-49).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased.

As per claim 15, Holmberg teaches a computer program product in a computer readable medium for processing instructions of a computer program, comprising:

second instructions for enabling counting, by a processor, of a number of times instructions of the portion of code of the computer program, having an associated performance indicator, are executed to generate a first count (See column 4, lines 56-67: Multiple counters are used—including one for counting the times an instruction is executed);

third instructions for enabling counting, by a processor, of a number of times there is a cache miss when executing instructions of the portion of code of the computer program having associated performance indicators to generate a second count (See column 4, lines 56-67: Multiple counters are used—including one for counting the times an instruction is not taken); and

fourth instructions for determining if a problem condition is present in a cache based on the first count and the second count (See figure 2 and 3: Counters are checked to see if a threshold condition has been exceeded).

Holmberg does not teach a performance indicator or a system for tracking data beyond branch instructions and pertains to branch instructions only.

Burrows does teach a first instructions for associating a performance indicator (See figure 5, and column 5, lines 11-13: The count field 530 is an indicator of how many times the code has been encountered) with at least one instruction of a portion of code of the computer program (See figure 5: The count field is placed within an instruction). Burrows' invention also applies to any sort of instruction.

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased. The performance indicator is another form of providing more data. It is also of note that one of the references cited in Holmberg is Burrows.

As per claim 16, Holmberg teaches wherein the first count and the second count are maintained in a hardware counter associated with the processor (See figure 1 and 2: The counters 209, 211 are part of the branch prediction unit 119, which is a part of the processor).

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Holmberg does not teach providing statistics for non-branch related instructions.

Burrows does teach providing statistics for non-branch related instructions (See column 2, lines 47-49).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased.

As per claim 17, Holmberg teaches wherein the fourth instructions for determining if a problem condition is present in a cache based on the first count and the second count include:

instructions for generating a cache hit-miss ratio based on the first count and the second count (See column 4, lines 56-63 and column 5, lines 39-43: Multiple counters are used to track data and that data is compared by seeing how relatively close to being equal they are—which is a ratio);

instructions for comparing the cache hit-miss ratio to a predetermined threshold value (See column 5, lines 28-31: The data is compared to a preset threshold value);
and

instructions for determining that a problem condition exists if a predetermined relationship between the cache hit-miss ratio and the predetermined threshold value is

present (See column 5, lines 28-43: New predictions are made if threshold value is surpassed).

Holmberg does not teach providing statistics for non-branch related instructions.

Burrows does teach providing statistics for non-branch related instructions (See column 2, lines 47-49).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased.

As per claim 18, Holmberg teaches further comprising: fifth instructions for sending an interrupt to an interrupt handler of a performance monitoring application if a problem condition is determined to be present (See figure 3a: A count greater than the threshold results in a new prediction to be made and thus the system must be informed of this with interrupts signals).

Holmberg does not teach a performance monitor application nor does Holmberg teach providing statistics for non-branch related instructions.

Burrows teaches sending an interrupt to an interrupt handler of a performance monitoring application if a problem condition is determined to be present (See column 2, line 62: A signal is sent to generate a monitor program).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased. The addition of a monitor application is yet another form of providing more data.

As per claim 19, Holmberg teaches wherein the predetermined relationship is that the cache hit-miss ration meets or falls below the predetermined threshold value (See column 5, lines 28-31: The data is compared to a preset threshold value and the preset threshold value can be set so such condition is met).

Holmberg does not teach providing statistics for non-branch related instructions.

Burrows does teach providing statistics for non-branch related instructions (See column 2, lines 47-49).

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased.

As per claim 29, Holmberg teaches an apparatus for processing instructions of a computer program, comprising:

means for enabling counting, by a processor, of a number of times instructions of the portion of code of the computer program, having an associated performance indicator, are executed to generate a first count (See column 4, lines 56-67: Multiple counters are used—including one for counting the times an instruction is executed);

means for enabling counting, by a processor, of a number of times there is a cache miss when executing instructions of the portion of code of the computer program having associated performance indicators to generate a second count (See column 4, lines 56-67: Multiple counters are used—including one for counting the times an instruction is not taken); and

means for determining if a problem condition is present in a cache based on the first count and the second count (See figure 2 and 3: Counters are checked to see if a threshold condition has been exceeded).

Holmberg does not teach a performance indicator or a system for tracking data beyond branch instructions and pertains to branch instructions only.

Burrows does teach means for associating a performance indicator with at least one instruction of a portion of code of the computer program (See figure 5, and column 5, lines 11-13: The count field 530 is an indicator of how many times the code has been encountered) with at least one instruction of a portion of code of the computer program (See figure 5: The count field is placed within an instruction). Burrows' invention also applies to any sort of instruction.

Modifying Holmberg to include the teachings of Burrows would have been obvious to a person having ordinary skill in the art at the time the invention was made because a general system, as opposed to the branch-specific system of Holmberg, would allow greater ability to track data and thus better predictions can be made. More data means more informed decisions can be made and thus accuracy is likely to be increased. The performance indicator is another form of providing more data. It is also of note that one of the references cited in Holmberg is Burrows.

Allowable Subject Matter

8. Claims 6-8, and 20-28 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 101, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.
9. Claims 6-14 and 20-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
10. The following is a statement of reasons for the indication of allowable subject matter: The prior art of record neither anticipates nor renders obvious performing or using a chase tail operation as means for a cache replacement algorithm or the combination of the determination and loading steps/instructions of claims 6 and 20 (i.e. the claims describing the chase tail operation without explicitly naming the operation).

11. As allowable subject matter has been indicated, applicant's reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to show further art related to the method and apparatus for autonomic detection of cache "chase tail" conditions and storage of instructions/data in "chase tail" data structure:

U.S. Patent # 5,276,833 to Auvinen et al shows a data cache management system with test mode using index registers and CAS disable and posted write disable.

U.S. Patent # 5,287,481 to Lin shows an automatic cache flush with readable and writable cache tag memory.

U.S. Patent # 5,537,572 to Michelsen et al shows a cache controller and method for dumping contents of a cache directory and cache data random access memory.

13. The following article is cited to show further art related to the method and apparatus for autonomic detection of cache "chase tail" conditions and storage of instructions/data in "chase tail" data structure:

"Cost-Sensitive Cache Replacement Algorithms" by Jeong et al shows different cache replacement algorithms, including one utilizing reserved cache blocks.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vincent Lai whose telephone number is (571) 272-6749. The examiner can normally be reached on M-F 8:00-5:30 (First BiWeek Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fritz M. Fleming can be reached on (571) 272-4145. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Vincent Lai
Examiner
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GROUP 2100

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